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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application Number: 10/534,299
Filing Date: May 09, 2005
Appellant(s): STREBELLE ET AL.

Richard L. Treanor
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed February 15, 2008 appealing from the Office action mailed July 27, 2007.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect.

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

| | | |
|---|---|---|
| 6,288,248 B1 | STREBELLE | 9-2001 |
| JP 4-327582 | FUKUDA(Takehisa) | 11-1992 |

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strebelle et al. (US 6,288,248 B1) in view of Fukuda et al., a.k.a. Takehisa (JP 4-327582).

Strebelle et al. (US 6,288,248 B1) teach a process for the manufacture of epichlorohydrin (1, 2-epoxy-3-chloropropane) by reaction of allyl chloride with a peroxide compound in the presence of a TS-1 catalyst and a solvent such as methanol (see entire disclosure, in particular column 1, line 5 to column 3, line 33). Strebelle et al. teach that the peroxide compound which can be used in their invention can be chosen from hydrogen peroxide and any peroxide compound containing an active oxygen and capable of carrying out an epoxidation (see column 2, lines 29-36). A loop reactor is disclosed in example 1.

Strebelle et al. disclose all of the claimed limitations except the use of an allyl chloride comprising less than 2000 ppm by weight of 1,5-hexadiene.

Fukuda et al. teach a process for preparing an epichlorohydrin (1, 2-epoxy-3-chloropropane), which is analogous to the claimed process. Fukuda et al. teach that in said process it is desirable to utilize an allyl chloride comprising a 1,5-hexadiene content below 0.1 weight % (1000 ppm), see CAPLUS abstract or claim 1 and paragraph 0009 of English translation. The 1, 5-hexadiene is taught to be converted to 1, 2-epoxy-5-hexene by oxidation (see WPIDS abstract or paragraph 0008 of English translation). It is taught that this by-product 1,2-epoxy-5-hexene cannot be separated from epichlorohydrin by distillation (see WPIDS abstract or paragraph 0008 of English translation). Thus, the process of Fukuda et al. allows one to more economically prepare high purity epichlorohydrin.

One having ordinary skill in the art at the time the invention was made would been motivated to utilize an allyl chloride having a 1,5-hexadiene content below 0.1 weight % (1000 ppm), as taught by Fukuda et al. in the process of Strebelle et al. because it would allow the

artisan to prepare the epichlorohydrin of Strebelle et al. without formation of the unwanted by-product, 1,2-epoxy-5-hexene, which would form as a result of the oxidation of the1,5-hexadiene by the peroxide used in the epoxidation of allyl chloride.

The Examiner believes that the teaching of Fukuda et al. is properly combinable with the teaching of Strebelle et al. because they are directed to analogous subject matter, i.e. epoxidation of an allyl chloride with a peroxide and both seek to solve a similar problem in the art, i.e. generation of unwanted by-products which are difficult to remove from epichlorohydrin.

Although Strebelle et al. teach the use of solvent the skilled artisan would find it obvious to also conduct the reaction in the absence of a solvent, since Fukuda et al. teaches that the use of a solvent is optional (see paragraph 0010).

Although Strebelle et al. do not specifically teach the use of the zeolites MCM-41, the skilled artisan would have found it obvious to utilize any zeolite which is similar in structure to either TS-1, ZSM-5 or ZSM-11 (see column 2, lines 14-23).

**(10) Response to Argument**

1) The Appellants argue that in a three component reaction-reactant, oxidizing agent and a catalyst Strebelle and Takehisa (Fukuda) differ significantly in their choice of two of the three and are thus not analogous reactions.

The Examiner disagrees. They are analogous reactions because they both deal with preparing epichlorohydrin by reacting allyl chloride (reactant) with a peroxide (oxidizing agent) in the presence of a catalyst. It is true that they use different oxidizing agents, but the oxidizing agents are analogous in that they are both peroxides and as one can see from the teachings of Strebelle, the skilled artisan would expect to obtain an epichlorohydrin product using either hydrogen peroxide or an alkyl peroxide as the oxidizing agent (see column 2, lines 29-36). Also the difference in the catalyst does not affect the desired outcome of obtaining an epichlorohydrin product.

2) The Appellants argue that although Strebelle and Takehisa (Fukuda) both desire a pure product, their approach is quite different.

This argument should not be persuasive because the skilled artisan would be motivated to combine the approach of Takehisa (Fukuda) with the approach of Strebelle in order to obtain an even further purified epichlorohydrin product. Thus, one would get the purification benefits obtained by both Takehisa (Fukuda) and Strebelle, i.e. reduction of unwanted by-products, in particular the chloro impurities, disclosed by Strebelle as well as reduction of the by-product 1,2-epoxy-5-hexene that forms from the oxidation of 1,5-hexadiene that is present in the allyl chloride starting material, as taught by Takehisa (Fukuda). The 1,2-epoxy-5-hexene cannot be separated from the epichlorohydrin by distillation. Thus, reduction in its formation is desirable.

3) The Appellants argue that based upon the 1998 article by Sheldon, Strebelle and Takehisa (Fukuda) are not combinable.

This argument should not be persuasive because the rejection is not based upon the use of the Takehisa (Fukuda) catalyst with the Strebelle peroxide, but rather the substitution of the allyl chloride of Takehisa for the allyl chloride of Strebelle for use in the process of Strebelle. One having ordinary skill would reasonably expect to successfully obtain the desired epichlorohydrin product with this substitution.

4) The Appellants argue that the Examiner has used hindsight.

This argument should not be persuasive because it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the invention was made, and does not include knowledge gleaned only from the Applicant's disclosure, such reconstruction is proper. See In re McLaughlin, 443 f.2d 1392; 170 USPQ 209 (CCPA 1971).

In KSR, the Supreme Court particularly emphasized "the need for caution in granting a

patent based on the combination of elements found in the prior art,"Id. at ___, 82 USPQ2d at 1395, and discussed circumstances in which a patent might be determined to be obvious. Importantly, the Supreme Court reaffirmed principles based on its precedent that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."Id. at ___, 82 USPQ2d at 1395.

In the instant case the Examiner used the knowledge provided by Takehisa (Fukuda) of the desirability of using an allyl chloride with a low 1,5-hexadiene content when preparing epichlorohydrin by oxidation of allyl chloride with a peroxide. The process of Strebelle is one wherein epichlorohydrin is prepared by oxidation of allyl chloride with a peroxide.

5) The Appellants argue that the Examiner has ignored the fact that Strebelle specifically pairs hydrogen peroxide with a zeolite catalyst while Takehisa pairs an alkyl hydroperoxide with different catalysts.

This argument should not be persuasive because Strebelle also teaches the use any peroxide compound containing active oxygen and capable of carrying out an epoxidation. This would include the use of alkyl peroxides like those taught by Takehisa (Fukuda). The fact that Strebelle and Takehisa (Fukuda) use different catalysts should not matter, since it the reaction of the 1,5-hexadiene with the oxidant (peroxide) that is the problem not the type of catalyst that is used.

6) The Appellants argue that the Examiner has ignored the fact that combination of Strebelle's peroxide with Takehisa's catalyst was specifically taught against by the art.

This argument should not be persuasive because as discussed earlier the rejection is not based upon the use of the Takehisa (Fukuda) catalyst with the Strebelle peroxide, but rather the substitution of the allyl chloride of Takehisa (Fukuda) for the allyl chloride of Strebelle for use in the process of Strebelle. One having ordinary would reasonably expect to successfully obtain the desired epichlorohydrin product with this substitution.

7) The Appellants argue that there is no motivation to purify allyl chloride when using a zeolite catalyst or hydrogen peroxide as in Strebelle and the present invention.

The Examiner disagrees. One having ordinary skill in the art would be motivated to use a purified allyl chloride in Strebelle for the same reason taught by Takehisa (Fukuda), i.e. to avoid the oxidation of 1,5-hexadiene, which Takehisa (Fukuda) teaches is usually present in allyl chloride (see WPIDS abstract or paragraph 0008 of English translation). The 1,2-epoxy-5-hexene produced therefrom is difficult to separate from the epichlorohydrin by distillation (see WPIDS abstract or paragraphs 0007-0009 of English translation). Distillation is used by Strebelle to further purify the epichlorohydrin (see for example column 4, line 37 to column 5, line 39). The skilled artisan would reasonably expect to encounter the same oxidation of the 1,5-hexadiene when using the zeolite catalyst and hydrogen peroxide in the process of Strebelle as is encountered when using the alkyl peroxide and catalysts of Takehisa (Fukuda).

8) In response to Appellant's argument of an improvement in catalyst life, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See Ex parte Obiaya, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

The prior art also provides motivation to use an allyl chloride having reduced 1,5-hexadiene when preparing epichlorohydrin.

9) The Appellants arguments regarding inherency should also not be persuasive because in using the allyl chloride of Takehisa (Fukuda) in the process of Strebelle one would reasonably expect that the zeolite of Strebelle also has an improved catalyst life, since the combination of Takehisa (Fukuda) and Strebelle teach each and every element of the claimed invention. Thus, any advantages that result in the instant process would also result in the combination of Takehisa (Fukuda) and Strebelle.

10) The Appellants arguments with respect to unexpected results should not be persuasive because the examiner believes that the prior art references when combined would give one an easy method for obtaining high purity epichlorohydrin product that would inherently overcome the reduced catalyst life problem relied upon by Applicants for patentability. Granting a patent on the discovery of an unknown but inherent function would re-move from the public that which is in the public domain by virtue of its inclusion in, or obviousness from, the prior art. Further, the Examiner does not believe that the results obtained by the Applicants were already present in the prior art. In particular because Takehisa (Fukuda) already taught that a reaction would occur between the peroxide and the 1,5-hexadiene leading to an increase in by-products, which the Applicants believe to be responsible in part to the problem of the deactivation of the catalyst (see specification page 2, lines 10-19). Thus, reduction of these by-products in the prior art would naturally lead to an improvement in catalyst life.

11) The Appellants argue that the Examiner is requiring comparison of the results of the invention with the results of the invention. The Examiner disagrees because the prior art teaches reacting an allyl chloride having reduced 1,5-hexadiene content with a peroxide to produce 1,2-epoxy-3-chloropropane (epichlorohydrin).

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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